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FCC - CE Mark Testing and Design Consulting

How to Self-Certify For the CE Mark

A Quick Start Guide by Dennis King - EMI Test Lab

For questions and details contact Dennis at dennis@emitestlab.com

Introduction

The CE mark (an acronym for the French "Conformite Europeenne") certifies that a product meets EU health, safety, and environmental requirements, which ensure consumer safety and - for most products - also say that the product meets a minimum level of Quality with regards to EMI (Electro Magnetic Interference) and Product Safety. Manufacturers in the European Union (EU) and around the world must meet CE marking requirements in order to market their products in Europe.

Here's a list of countries that require the CE mark;

Austria	Hungary	Poland
Belgium	Iceland	Portugal
Bulgaria	Ireland	Romania
Cyprus	Italy	Slovakia
Czech Republic	Latvia	Slovenia
Denmark	Liechtenstein	Spain
Estonia	Lithuania	Sweden
Finland	Luxembourg	Switzerland
France	Malta	Turkey
Germany	Netherlands	United Kingdom
Greece	Norway	

A manufacturer, who has gone through the conformity assessment process, may affix the CE mark to the product. With CE marking, the product may be marketed throughout the EU.

CE marking provides product access to 32 countries with a population of nearly 500 million.

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Overall Summary of the CE Mark Process

A typical computing product

1. Determine if your product requires a “Notified Body” Lab or if you can “Self-Certify”. Most digital computing type products are eligible for “Self-Certification”. If a product can seriously hurt someone, is used in the operating room, or operates in a dangerous environment, the product probably requires a Notified Body to be involved. See the details below for examples of products that can and cannot be “Self-Certified”.
2. Identify the appropriate standards for your product, usually EMC and Product Safety.
3. Conduct the EMC Testing (Emissions and Immunity) and have the Product evaluated for Product Safety – and any other related standards.
4. When the EMC and Product Safety evaluations are finished, and you have passing test reports, create a one page Declaration of Conformity (DoC) document that will ship with the unit into the EU. See details of the DoC later in this guide.
5. Apply the CE Mark to the unit and Packaging. Most people also include the DoC as a page in the User Guide and include a copy with the shipping documents.
6. Create a Technical Construction File (TCF) that contains technical information to back up your claim that your product passes CE Mark requirements. This file needs to be made available, upon request, to Government Authorities in the EU.
7. ***SHIP IT!*** into the EU.

Although the EU has more tests for the CE Mark than the FCC requires in America, the EU has made the process simpler and quicker by allowing manufacturers to Self-Certify.

Self-Certify means a manufacturer can create an in-house test lab that could do all the testing or use an outside resource that already has the test equipment and expertise such as EMI Test Lab.

Here’s a link to the Department of Commerce explaining how the Self-Certification process works

US Dept of Commerce - Self-Certify for the CE Mark

The Details – a typical computing product

Does my Product Qualify for Self-Certification?

1. **Some examples for which manufacturers can self-certify include**:
   · Safety of Machinery Directive
   · Electromagnetic Compatibility (EMC) Directive – this covers most computing devices
   · Low Voltage Directive – applies to most computing devices
   · Class I products of the Medical Device Directive
   · Most products covered by the Radio and Telecommunications Terminal Equipment (R&TTE) Directive

2. **Some examples of the directives that do not allow manufacturers to self-certify include:**
   · Simple Pressure Vessels Directive
   · Appliances Burning Gaseous Fuels Directive
   · Most products covered by the Pressure Equipment Directive
   · Most products covered by the Equipment and Protective Systems in Potentially Explosive Atmospheres Directive

What Standards Apply to my Product?

There are many standards and this can become confusing. One way to get started is to look at the user guides of similar products, from major companies, and see which standards they quote. From there you can look at any of the companies that sell standards and they will let you see the first 10-20 pages or so, before you buy the standard, to determine if the standard applies to your product.

Here are a few of the most common standards for EMC (Electro Magnetic Compatibility);

EN 55022 - Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement

EN 55024 - Information technology equipment. Immunity characteristics. Limits and methods of measurement

EN 61326 – 1 - Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements

EN 60601-1-2 - Medical electrical equipment. General requirements for basic safety and essential performance. Collateral standard. Electromagnetic compatibility. Requirements and tests

Here are some of the Safety Standards;

EN 60950-1 - Information technology equipment. Safety. General requirements

EN 61010-1 - Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

EN 60601-1-2 - Medical electrical equipment. General requirements for basic safety and essential performance. Collateral standard. Electromagnetic compatibility. Requirements and tests

Testing for EMC and Product Safety – Test Plan

One of the requirements for EMC testing is a Test Plan. The information from the test plan can be used to issue a quote and also helps the test lab know how your product should be tested. Ideally, it's also an agreement between the manufacturer and the test lab that says we will test the product "this way". Upon completion of this plan we agree that the product meets the applied standard.

Emissions Test Plan Information

For Emissions, some of the information required will describe the test modes, the I/O's and cables, the software, functionality of the unit and how "worst case" will be determined if the unit has several operating modes. In general, all of the I/O's need to be exercised during the testing. There are many more details that are also included such as clock frequencies.

Immunity Test Plan Information

For Immunity one of the most important pieces of information is how will the unit be monitored in order to know if the applied interference is affecting the equipment. Sometimes special software is written to put the unit in a "loop mode" that will make testing go faster.

Product Safety Testing

User Manual, BOM, Schematics and electrical ratings are some of the first information a Product Safety Engineer looks for to determine compliance with Safety Standards. Be prepared to answer many more questions as the evaluation continues.

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Why Test for EMC/EMI? (Electro Magnetic Compatibility – Electro Magnetic Interference)

Besides the 1993 EU Law that says your product must meet the requirements for the CE Mark, Radiated Emissions and Immunity issues are the reason why Hospitals don't want cell phone use and why you are not allowed to use electronic equipment when your flight is taking off. Very serious issues and loss of life has led to the legal requirements for manufacturers to test for these requirements.

Since Emissions requirements reduce noise created by a product and Immunity requirements increase a Product's ability to reject noise the Product ends up becoming a higher "Quality" design.

The worst case reason - if a product is found to be non-compliant, you can be fined and a recall of all equipment can be ordered. Germany and other countries are known to do random audits of equipment.

Testing for EMC – Test details

EMC testing can be broken down into two categories, Emissions and Immunity.

Emissions can be thought of as unintentional noise that your product generates and sends out into space. This noise has the potential to jam other equipment or transmitters that use specific frequencies, so we limit the amount of noise that products are allowed to send out into space. This noise can be thought of as "Electromagnetic Pollution".

Immunity can be thought of as your Products ability to reject noise coming in from an outside source. Testing for Immunity is designed to show that your product can operate in a "noisy" environment and still operate as intended.

What are the Tests?

Summary of CE Mark Tests – details change with the product type and standard, here are typical examples;

Emissions

EN 55011, EN 55022 - Radiated Emissions
Either Class A (commercial areas, limit is 10dB higher than residential) or Class B (residential). Typically tested from 30 MHz to 1 GHz and as high as 6 GHz, tested in a chamber such as EMI Test Lab's chamber or on an open area test site.

EN 55011, EN 55022 - Conducted Emissions
Either Class A or B, matched to Emissions testing. This is noise that the Product is putting back onto the AC Mains through the power supply cord. Tested from 150 kHz to 30 MHz, then radiated emissions starts at 30 MHz.

EN 61000-3-2 - AC Power Line Harmonics
Related to the power factor of the supply, make sure the supply meets this before you start testing by getting their DoC (Declaration of Conformity) and EMC report.

EN 61000-3-3 – Voltage Fluctuations and Flicker Testing
Mostly an environmental type of test to make sure that the product would not cause lights to "flicker" causing a potential health hazard to people.

Immunity

EN 61000-4-2 Electro Static Discharge
Simulates the spark that comes off your finger and hits the door knob, very destructive to electronics. Literally modeled after the same spark by the standards committee, approximately the same pulse rise and fall time and voltages.

EN 61000-4-3 Radiated Radio Frequency Immunity
Tested typically as a swept transmitted signal from 80-1,000 MHz with modulation applied to the carrier wave. This test resembles intentional transmitter noise close by or another product that may be emitting noise in the vicinity of your device. It's tested in a chamber and you need to have a way to monitor if the device is affected by the applied interference signal - usually by monitoring software outside the chamber or using a camera on the equipment that is monitored outside the chamber.

EN 61000-4-4 Electrical Fast Transients
First used by the Military and called the "chattering relay test" it's a series of pulses injected through the power supply or directly onto I/O cables that are 3 meters and longer.

EN 61000-4-5 Surge Immunity
Intended to simulate the pulse that your power supply would see if there was a lighting hit close by. Make sure your power has been tested for this before you start CE testing. It should be listed in the DoC, the data sheet or in the EMC test report.

EN 61000-4-6 Conducted Immunity
This is the lower frequency version of the EN 61000-4-3 test. It's applied to the power supply and I/O cables 3 meters and longer. It covers 150 kHz to 80 MHz. The EN 61000-4-3 test takes over at 80 MHz.

EN 61000-4-8 Magnetic Immunity, power frequency
This simulates your product being close to a magnetic source of interference such as a power transformer. If your product doesn't have any magnetic sensitive devices this test may not apply to your equipment.

EN 61000-4-11 Voltage Dips, Interrupts and Variations
Brown outs and unreliable AC or noisy AC lines can create the conditions simulated in this test. If you can pull the plug on your equipment, while it's working, and the unit will not be damaged, you will pass part of this testing.

A Note about Your Product's Power Supply…

Before you start lab testing get a copy of the Declaration of Conformity (DoC) and if possible, the EMC test report from the manufacturer of the power supply. If they don't have it, don't know what it is, or any other excuse**,** get another power supply before you start testing!

Chances are very good if you can't get a DoC for a power supply it will fail the CE tests and cost you money and time to market when you have to re-test.

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When you pass testing create a Declaration of Conformity (DoC)

The DoC is the single page legal document that shows that your product meets the CE Mark Directives and Standards. This must be signed by a responsible person within the company that will take responsibility for the product being compliant - with respect to the CE Mark. If there are any issues – you jam someone's frequency, your product burns down someone's building – whoever signs this document is the person that the EU Officials will look for first.

Ship a physical copy of the DoC along with the shipping documents in case a Customs Agent decides to audit your shipment into the EU.

An Example of a Declaration of Conformity

Manufacturer: XYZ Corp.
325 Grassy Knoll
Garden City, New York
Telephone No. (516) 555-3333

Product: Walk-Behind Lawn Mower (3.5 HP)
Model No. 3.5L
Serial Number 350000-360000

The undersigned hereby declares, on behalf of the XYZ Corp. of Garden City, New York, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

- Council Directive 2006/42/EC (May 17, 2006) on the Approximation of the Laws of the Member States Relating to Machinery;
- Council Directive 2004/108/EC (December 15, 2004) on Electromagnetic Compatibility;
- List European standards used
- Council Directive 2006/95/EC (December 12, 2006) on Low Voltage Equipment Safety;
- List European standards used
- Council Directive 2000/14/EEC amended by Directive 2005/88/EC (June 17, 2006) about noise limits and labeling requirements machines intended for use outdoors.

The Technical Construction File required by this Directive is maintained at the corporate headquarters of XYZ, Inc., 325 Grassy Knoll, Garden City, New York.

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Signature Dated

Joseph P. Glass (Name)
Vice President–Design Engineering (Title)

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Apply the CE Mark

The CE logo must be at least 5 mm high except on small equipment or products where there's not enough room. When it can't be placed on the product itself, it must be placed on the packaging and the accompanying literature.

Most companies apply the CE Logo to the packaging and the shipping boxes so the Customs agent can see it.

The logo must not be modified from the original proportions; you cannot simply use the letters CE.

Create a Technical Construction File – TCF

The purpose of the TCF is to provide all the documentation, in one place, that can back up your claim on your Declaration of Conformity that your product does meet all applicable requirements for the CE Mark. It needs to be kept and made available for 10 years after you stop shipping a product into the EU. Whoever your representative is in the EU, typically an importer, should have a copy of the TCF. You are only legally required to show it to EU Government officials, upon request.

It has two parts, Part A and Part B.

Part A is a summary of the detailed information in part B. The idea is that if your TCF is ever requested part A should be enough information to keep the requester happy. It's a much smaller file and easier to read through in a few minutes.

In part A you should have all your company contact information, summarize your product, the environment it's use in, how it's used, and which standards and directives you applied for the testing. You should also include a User Guide that will show all the correct warnings and symbols that your EMC Engineer and your Product Safety Engineer told you to add in.

Part B contains the EMC report, the Product Safety report, your schematics, Bill of Materials and any information about how the continued compliance is verified through your companies Quality Control procedures.

After doing all of these steps for the CE Mark

SHIP IT! into the EU!!

Please don't hesitate to direct any questions to Dennis King at mailto:dennis@emitestlab.com or call me in the lab at (303)684-6650

We also have an In-House Safety Engineer and Safety Lab that can help you Self-Declare for the CE Mark.